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(54) Modular rearview mirror assembly

Rückblickspiegel in Modulbauweise

Retroviseur à construction modulaire

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Description

[0001] This invention relates to rearview mirror assemblies for vehicles.

[0002] EP 788,947 corresponds to the pre-characterising part of claim 1 and discloses an interior rearview mirror assembly for a vehicle comprising a mirror case having a reflective mirror element providing a rearward field of view for viewing by the driver of the vehicle, and a support for mounting said assembly on the vehicle.

[0003] The present invention provides an improved rearview mirror assembly of the above type which is characterized in that a pod is mounted on said support; and said pod comprises a video camera, said video camera being oriented so that the field of view of the camera includes a view of the head of the driver of the vehicle, said mirror case further including a circuit element comprising electrical circuitry for processing an image captured by said video camera, said circuit element located within said mirror case.

[0004] An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing whose single figure is a fragmentary sectional elevation of a modular vehicle rearview mirror assembly.

[0005] Referring to the drawing, a modular rearview mirror assembly 500 includes a mirror case 502, with a bezel 501 and reflector 504 supported therein, and a pod 506 both of which are mounted to a window button 500a adhered to windshield W by a mirror mount 526. Mirror assembly 500 may optionally include a support 502a, including a fixed or movable support, for mounting case 502 to mirror mount 526. As will be more fully described below, mirror assembly 500 may also include one or more of a plurality of electrical and/or electronic components mounted in or on any one of the components of mirror assembly 500, including case 502, bezel 501, pod 506, mirror mount 526, windshield button 500a, support 502a, and /or carrier member or circuit board 510, and the like. A blind spot detection indicator 503 may be positioned in reflector 504. Furthermore, mirror assembly 500 may include a rain sensor 505 mounted, for example, in pod 506. Rain sensor functionality, as is commonly known in the automotive art, is provided in association with an interior rearview mirror assembly. Such association includes utilizing an element of the rearview mirror assembly (such as a plastic housing attached, for example, to the mirror channel mount that conventionally attaches the mirror assembly to a windshield button) to cover a windshield-contacting rain sensor (such as is described in U.S. Patent 4,973,844) or it may include a non-windshield-contacting rain sensor (such as is described in WO 94/27262). Also, a mirror mounted video camera can be used to visually detect the presence of moisture on the windshield, and actuate the windshield wipers accordingly.

[0006] Modular rearview mirror assembly 500 may also include one or more displays 507 which may be mounted on one or more of the assembly components as noted above. Displays 507 may perform a single display function or multiple display functions, such as providing indication of an additional vehicle function, for example a compass mirror display function, a temperature display function, status of inflation of tires display function, a passenger air bag disable display function, an automatic rain sensor operation display function, telephone dial information display function, highway status information display function, blind spot indicator display function, or the like. Such display may be an alphanumerical display or a multi-pixel display, and may be fixed or scrolling. Such an automatic rain sensor operation display function may include a display function related to rain sensor 505 for both a windshield-contacting and a non-windshield-contacting rain sensor, including, for example, where the circuitry to control rain sensor 505 and other electrical and/or electronic devices, including electrochromic dimming circuitry 504a of a variable reflectance electrochromic mirror, bulb holders, and switches, are commonly housed in or on rearview mirror assembly 500 and wholly or partially share components on common carrier member or circuit board 510. Circuit board 510 may be of the type comprising a carrier member incorporating electrical circuitry. Display 507 may alternate between display functions by a display toggle which may be manually operated, time-shared, voice-actuated, or under the control of some other sensed function, such as a change in direction of the vehicle or the like. Should a rain sensor control circuitry 505a be associated with, incorporated in, or coupled to interior rearview mirror assembly 500, rain sensor control circuitry 505a, in addition to providing automatic or semi-automatic control over operation of the windshield wipers (on the front and/or rear windshield of the vehicle), may be adapted to control the defogger function to defog condensed vapor on an inner cabin surface of a vehicle glazing (such as the inside surface of the front windshield, such as by operating a blower fan, heater function, air conditioning function, or the like), or rain sensor control circuitry 505a may be coupled to a sunroof to close the sunroof or any other movable glazing should rain conditions be detected.

[0007] As stated above, it may be advantageous for the rain sensor control circuitry 505a (or any other feature such as a head-lamp controller, a remote keyless entry receiver, a cellular phone including its microphone, a vehicle status indicator and the like) to share components and circuitry with other components and/or control circuitry, for example with an electrochromic mirror function control circuitry and an electrochromic mirror assembly itself. Also, a convenient way to mount a non-windshield-contacting rain sensor is by attachment, such as by snap-on attachment, as a module to the mirror channel mount such as is described in U.S. Patent 5,576,678. The mirror mount and/or windshield button may optionally be specially adapted to accommodate a non-windshield-mounting rain sensor module. Such

mounting as a module is readily serviceable and attachable to a wide variety of lighted and unlighted interior mirror assemblies (both electrochromic and non-electrochromic such as prismatic, manually adjusted mirror assemblies), and can help ensure appropriate alignment of the non-windshield-mounted variety of rain sensor to the vehicle windshield insofar that the module attached to the mirror mount remains fixed whereas the mirror itself (which typically attaches to the mirror channel mount via a single or double ball joint support) is movable so that the driver can adjust its field of view. Also, should smoke from cigarettes and the like be a potential source of interference to the operation of the non-windshield-contacting rain sensor, then a mirror-attached housing can be used to shroud the rain sensor unit and shield it from smoke (and other debris). Optionally, such ability to detect presence of cigarette smoke can be used to enforce a non-smoking ban in vehicles, such as is commonly requested by rental car fleet operators. Also, when a rain sensor (contacting or non-contacting) is used to activate the wiper on the rear window (rear blacklight) of the vehicle, the rain sensor may be alternatively packaged and mounted with the CHMSL (center high mounted stop light) stop light assembly commonly mounted on the rear window glass or close to it. Mounting of the rain sensor with the CHMSL stop light can be aesthetically appealing and allow sharing of components/wiring/circuitry.

[0008] The embodiment of the invention is equipped with a variety of features, such as a home access transmitter 508a, a high/low (or daylight running beam/low) headlamp controller 508b, a hands-free phone attachment 508c, a video camera 508d for internal cabin surveillance and/or video telephone function, a remote keyless entry receiver 508e, a compass 508f, a seat occupancy detection 508g, one or more map reading lights 508h, a trip computer 508i, an intrusion detector 508j, and the like. Display 507 may also include a compass/temperature and/or clock display, fuel level display, and other vehicle status and other information displays. Again, such features can share components and circuitry with, for example, electrochromic mirror circuitry 504a and other components of assembly 500 so that provision of these extra features is economical.

[0009] The video camera 508d is mounted in the pod 506 with the camera lens facing rearward in the vehicle and generally facing the driver. Placement of video camera 508d within the pod 506 has numerous advantages. For example, locating video camera 508d in pod 506 of rearview mirror assembly 500 provides the video camera 508d with an excellent field of view of the driver and of the interior cabin in general since the rearview mirror assembly 500 is centrally and high mounted. Also, mirror assembly 500 is at a defined distance from the driver so that focus of the video camera is facilitated. Video camera 508d may comprise a CCD camera or a CMOS based video microchip camera, such as is described in commonly owned, copending, PCT Application No. 94/13227 filed November 17, 1994. For operation at night, the internal cabin of the vehicle may optionally be illuminated with non-visible radiation, such as near-infrared radiation, with video camera 508d being responsive to the near-infrared radiation so that a video telephone call can be conducted even when the interior cabin is dark to visible light, such as at night.

[0010] Also, video camera 508d is adapted to capture an image of the face of a potential driver and then, using appropriate image recognition software, decide whether the driver is authorized to operate the vehicle and, only then, enable the ignition system to allow the motor of the vehicle be started. Use of such a mirror-mounted video camera enhances vehicle security and reduces theft. Further, video camera 508d may be adapted to monitor the driver while he/she is driving and, by detection of head droop, eye closure, eye pupil change, or the like, determine whether the driver is becoming drowsy/falling asleep, and then to activate a warning to the driver to stay alert/wake up.

[0011] It is beneficial to use a microprocessor to control multiple functions within the interior mirror assembly and/or within other areas of the vehicle (such as the header console area). Such microprocessor can, for example, control the electrochromic dimming function, a compass direction display, an external temperature display, and the like. For example, a user actuatable switch can be provided that at one push turns on a compass/temperature display, on second push changes the temperature display to metric units (i.e., to degrees Celsius), on third push changes to Imperial units (i.e., degrees Fahrenheit) and on fourth push turns off the compass/temperature display, with the microprocessor controlling the logic of the display. Alternately, a single switch actuation turns on the display in Imperial units, the second actuation changes it to metric units, and third actuation turns the display off. Further, the displays and functions described herein can find utility also on outside rearview mirrors. For example, a transducer 508k that receives and/or transmits information to a component of an intelligent highway system (such as is known in the automotive art) can be incorporated into an interior and/or outside rearview mirror assembly and, preferably, mounted to common circuit board or carrier member 510. Thus, for example, a transmitter/receiver 5081 for automatic toll booth function could be mounted at/within/on an outside sideview mirror assembly. Preferably, transmitter/receiver 5081 is also mounted to common circuit board or carrier member 510. A digital display of the toll booth transaction can be displayed by display 507. Optionally, a micro printer 509 may be incorporated within rearview mirror assembly 500 which can print a receipt or record of the transaction. In the illustrated embodiment, printer 509 is shown mounted in case 502, but it should be understood, as with most of the other components, that it can be mounted in a variety of locations on mirror assembly 500. Similarly, for safety and security on the highways, GPS information, state of traffic information,

weather information, telephone number information, and the like may be displayed and transmitted/received via transducers located at, within, or on an interior rearview mirror assembly and/or an outside sideview mirror assembly.

[0012] Also, interior rearview mirror assembly 500 may optionally include an Internet Interface circuit 511 to provide a link to the Worldwide Web. Circuit 511 may be coupled to a modem/cellular phone or cell phone control panel 512 mounted within the vehicle, and preferably, mounted at, within or on the interior rearview mirror assembly 500. Thus, the driver or passenger can interact with other road users, can receive/transmit messages including E-mail, can receive weather and status of highway traffic/conditions, and the like, via a mirror located interface to the INTERNET.

[0013] Further, a trainable garage door opener 513, including a universal garage door opener such as is available from Prince Corporation, Holland, Michigan under the tradename HOMELINK™, or a transmitter 514 for a universal home access system that replaces the switch in a household garage that opens/closes the garage door with a smart switch that is programmable to a household specific code that is of the rolling code type, such as is available from TRW Automotive, Farmington Hills, Michigan under the tradename KWIKLINK™, may be mounted at, within, or on interior mirror assembly 500 (or, if desired, an outside sideview mirror). Switches to operate such devices (typically up to three separate push type switches, each for a different garage door/security gate/household door) can be mounted on mirror assembly 500, preferably user actuatable from the front face of the mirror case 502 or pod 506. Preferably, the universal garage door opener HOMELINK™ unit or the universal home access KWIKLINK™ unit is mounted at, within, or on interior rearview mirror assembly 500. Optionally, such a unit could be mounted at, within or on an outside sideview mirror assembly.

[0014] The KWIKLINK™ Universal Home Access System (which operates on a rolling code, such as is commonly known in the home/vehicle security art) comprises a vehicle mounted transmitter and a receiver located in the garage. The KWIKLINK™ system is a low-current device that can be, optionally, operated off a battery source, such as a long life lithium battery. It is also compact and lightweight as executed on a single-or double-sided printed circuit board. The KWIKLINK™ printed circuit board can be mounted within the mirror housing (optionally adhered to a shock absorber comprising a double-sticky tape anti-scatter layer on the rear of the reflector element (prismatic or electrochromic) such as is described in U.S. Patent 5,572,354 or may be accommodated within pod 506, such as the detachable pod module described in U.S. Patent 5,576,678 and with the detachable module attached to the mirror mount or to the mirror button. Mounting the KWIKLINK™ unit in a detachable module has advantages, particularly for aftermarket supply where a battery operated KWIKLINK™ unit can be supplied within a pod housing (with the necessary user actuatable button or buttons mounted on the pod and with the battery being readily serviceable either by access through a trap door and/or by detaching the pod from the mirror mount). By supplying a battery-operated, stand-alone, snap-on, detachable KWIKLINK™ mirror mount pod, the KWIKLINK™ home access system can be readily and economically provided to a broad range of mirrors including non-electrical mirrors such as base prismatic mirrors, and electrical mirrors such as unlighted and lighted mirrors (including prismatic and electrochromic types) and electo-optic mirrors, such as electrochromic mirrors. Further, a solar panel 514a may be installed on the pod housing to recharge the battery.

[0015] Also, pod 506 may have a windshield button mount attached thereto or incorporated therein and have, in addition, a structure that replicates the windshield button standard on most vehicles manufactured in the United States. Thus, when a consumer purchases such an aftermarket product, the consumer simply removes the existing interior rearview mirror assembly from the windshield button it is attached to in the vehicle. Then, the consumer attaches a pod module windshield button mount of the type shown in U.S. Patent No. 4,930,742 to the windshield button attached to the windshield (this can be achieved either by sliding on and securing with a screwdriver, or by snap-on in a manner conventional in the mirror mounting art). Finally, the consumer now attaches the rearview mirror assembly to the windshield button replication structure that is part of the aftermarket pod module. Since the windshield button shape is largely an industry standard (but the interior rearview mirror mount that attaches thereto is typically not standard), by using this "button on a button" pod module design, an aftermarket product (such as a pod module incorporating one or more electrical and/or electronic devices, including the home access transmitter, universal garage door opener, security monitor such as a pyroelectric intrusion detector, remote keyless entry receiver, and compass, as described previously, and the like, may be readily installed by the vehicle owner, and the existing rearview mirror assembly can be readily remounted in the vehicle.

[0016] Interior mirror assembly 500 may further include a cellular phone 515 incorporated into interior mirror assembly 500 with its antenna, optionally, incorporated into the outside sideview mirror assembly or into inside rearview mirror assembly 500. Such mounting within the mirror assemblies has several advantages including that of largely hiding the cellular phone and antenna from ready view by a potential thief. Furthermore, seat occupancy detector 508g may be coupled to an air bag deployment/disable monitor, which can be located at, within or on the interior rearview mirror assembly 500. Seat occupancy detector 508g may comprise a video microchip or CCD camera seat occupancy detector, an ultrasonic detector, a pyroelectric detector, or anyone

or more of their combination. Moreover, where more than one rearview mirror is being controlled or operated, or when several vehicle accessories are linked to, for example, an electrochromic interior or outside mirror, interconnections can be multiplexed, as is commonly known in the automotive art. Moreover, where it is desired to display external outdoor temperature within the interior cabin of the vehicle, a temperature sensor (such as a thermocouple or thermistor) can be mounted at, within or on an outside sideview mirror assembly (for example, it can protrude into the slipstream below the lower portion of the sideview mirror housing in a manner that is aesthetically and styling acceptable to the automakers and to the consumer) and with the temperature sensor output connected, directly or by multiplexing to display 507 or a separate display (such as a vacuum fluorescent display) located in the interior cabin of the vehicle.

[0017] Preferably, the external temperature display is located at, within or on the interior rearview mirror assembly, optionally in combination with another display function such as a compass display, or as a stand-alone pod such as pod 506 as a module to a mirror support member (see U.S. Patent No. 5,576,687). Most preferably, the interior and outside mirror assemblies are supplied by the same supplier, using just-in-time sequencing methods, such as is commonly known in the automotive supply art and as is commonly used such as for supply of seats to vehicles. Just-in-time and/or sequencing techniques can be used to supply a specific option (for example, the option of configuring an external temperature display with a base prismatic interior mirror, or with a base electrochromic interior mirror, or with a compass prismatic interior mirror, or with a compass electrochromic interior mirror) for an individual vehicle as it passes down the vehicle assembly line. Thus, the automaker can offer a wide array of options to a consumer from an option menu. Should a specific customer select an external temperature display for a particular vehicle due to be manufactured by an automaker at a particular location on a specific day/hour, then the mirror system supplier sends to the vehicle assembly plant, in-sequence and/or just-in-time, a set of an interior rearview mirror assembly and at least one outside sideview mirror assembly for that particular vehicle being produced that day on the assembly line, and with the outside sideview mirror equipped with an external temperature sensor and with the interior rearview mirror assembly equipped with an external temperature display. Such just-in-time, in-sequence supply (which can be used for the incorporation of the various added features recited herein) is facilitated when the vehicle utilized a car area network or when multiplexing is used. Also, given that an interior electrochromic mirror can optionally be equipped with a myriad of features (such as map lights, reverse inhibit line, headlamp activation, external temperature display, remote keyless entry control, seat occupancy detector such as by ultrasonic, pyroelectric or infrared detection, and the like), it is useful to equip such assemblies with a standard connector (for example, a 10-pin parallel connector) such as electrical connections 410 for receiving a plug connector 312 as described above, so that a common standard wiring harness can be provided across an automaker's entire product range. Naturally, multiplexing within the vehicle can help alleviate the need for more pins on such a connector, or allow a given pin or set of pins control more than one function.

[0018] The interior rearview mirror assembly may include a loudspeaker (such as for a vehicle audio system, radio or the like, or for a cellular phone including a video cellular phone). Such loudspeaker may be a high frequency speaker that is mounted at, within, or on the interior rearview mirror assembly 500 (such as within the mirror case 502 or attached as a module-type pod to the mirror mount such as is described above and as shown as loudspeaker 517) and with its audio output, preferably, directed towards the front windshield of the vehicle so that the windshield itself at least partially reflects the audio output of the speaker (that preferably is a tweeter speaker, more preferably is a compact (such as about 1" x 1" x 1" in dimensions or smaller), and most preferably utilizes a neodymium magnet core) back into the interior cabin of the vehicle. Interior rearview mirror assembly 500 may also include a microphone 518 and a digital (or a conventional magnetic tape) recorder 519 with its associated circuitry 519a, which can be used by vehicle occupants to record messages and the like. Display 507 may be adapted to receive paging information from a pager 521, which may be incorporated in interior rearview mirror assembly 500, for example, in pod 506, and that displays messages to the driver (preferably via a scrolling display) or to other occupants. Interior rearview mirror assembly 500 may include a digital storage device 522, which stores information such as phone numbers, message reminders, calendar information, and the like, that can, automatically or on demand, display information to the driver.

[0019] The mirror ssembly may display directional information based upon compass sensor 508f (which may comprise a flux gate sensor, a magneto-responsive sensor, such as an magnetoresistive sensor, magneto-inductive sensor, or a magneto-capacitive sensor, a hall affect sensor, or an equivalent compass sensor). Alternatively, directional information obtained from a geographic positioning system such as a Global Positioning System (GPS) could be used to provide the compass direction signal for a mirror mounted display. For instance, a mirror of this invention could utilize as a variable reflective element with an electrochromic solid polymer matrix. Compass sensor 508f may be mounted anywhere in the vehicle and with its directional signal fed to a digital display, for example display 507, (such as a liquid crystal display, a vacuum fluorescent display, or light emitting diode display, an electro luminescent display, or the like) that is mounted at/in/on interior rearview mirror assembly 500. In another example, compass

sensor 508f may be mounted in the dashboard or in the header region close to the roof of the vehicle. Compass sensor 508f may also be mounted at interior rearview mirror assembly 500 by placement within pod 506 that fixedly mounts sensor 508f to mirror assembly support 526, which attaches interior mirror assembly 500 to windshield button mount 500a, and as is described in U.S. Patent Nos. 5,530,240 and 5,576,678.. In the illustrated embodiment, however, compass sensor 508f is mounted within case 502 of interior mirror assembly 500 along with its associated circuitry and any optional map lights (508h) and the like. Mounting of compass sensor 508f within the housing of the interior mirror assembly (as an alternate to placing the compass within pod 506, which may be fixedly attached to mirror support that typically attaches to the front windshield and bracket) has some advantages. For example, by mounting compass sensor 508f within case 502, pod 506 may be eliminated along with the wire harness, which would be required to couple the compass directional signals from sensor 508f in pod 506 to display 507, which is preferably mounted within case 502. Such location of compass sensor 508f within or at case 502 of mirror assembly 500 also means that there is no external evidence of the presence of the sensor, and, thus, aesthetics are potentially enhanced. Also, such placement of sensor 508f within case 502 of mirror assembly 500 is suitable for header mounted mirrors such as shown in U.S. Patent No. 5,615,857. Most preferably, sensor 508f is in the form of an integrated circuit chip mount (or similar printed circuit board insertable form) so that compass sensor 508f can be placed on circuit board 510 as are preferably the other electrical/electronic components within case 502 of interior mirror assembly 500. By having compass sensor 508f housed within the rearview mirror assembly 500 along with it wholly or partially sharing components, manufacturing and packaging economies are realized. Such housing of compass sensor 508f on common printed circuit board or circuit member 510 along with the other electrical and/or electronic components, for example, any one or more electrical or electronic components described in reference to this and earlier embodiments, including any electrochromic dimming circuitry to automatically dim reflectivity when glare conditions are detected by light sensors, displays, any bulb holders/switches, microprocessors, and their like, further enhances the manufacturing and packaging economies. Since case 502 of mirror assembly 500 is adjustable by the driver to assist his or her needs, a compass sensor 508f within case 502 may have a different orientation from one driver to another, which may result in a relatively minor inaccuracy in directional information. These inaccuracies, however, are typically unnoticeable and, moreover, may be mitigated by using stabilization means and algorithms, including fuzzy logic, and/or using deviation compensatory means, as are known in the compass art.

[0020] Further, where compass and compass/temperature displays are used, the front plate over the display may be angled relative to the driver's line of sight (between about 2° to 10° and, most preferably, between about 4° to 8° relative to line of sight), so that any headlight glare incident thereon is reflected away from the driver.

Claims

1. An interior rearview mirror assembly for a vehicle comprising:

   a mirror case (502) having a reflective mirror element (504) providing a rearward field of view for viewing by the driver of the vehicle; and
   a support (526) for mounting said assembly on the vehicle; **characterized in that**;
   a pod (506) is mounted on said support; and
   said pod comprises a video camera (508d), said video camera being oriented so that the field of view of the camera includes a view of the head of the driver of the vehicle, said mirror case further including a circuit element (510) comprising electrical circuitry for processing an image captured by said video camera, said circuit element located within said mirror case.

2. A rearview mirror assembly according to Claim 1, wherein said video camera comprises a charge coupled device camera or a CMOS based video microchip camera.

3. A rearview mirror assembly according to Claim 1 or 2 wherein said pod (506) extends from said support (526) to a position adjacent said mirror case (502).

4. A rearview mirror assembly according to Claim 1, 2 or 3 wherein said video camera (508d) is adapted for use with a cellular phone.

Patentansprüche

1. Innenrückspiegelbaugruppe für ein Fahrzeug, umfassend:

   eine Spiegeleinfassung (502) mit einem reflektierenden Spiegelelement (504), das ein Sichtfeld nach hinten zur Betrachtung durch den Fahrer des Fahrzeugs bereitstellt; und

   einen Halter (526) zum Anbringen der genannten Baugruppe an dem Fahrzeug, **dadurch gekennzeichnet, dass**

   ein Gehäuse (506) an dem genannten Halter angebracht ist; und

das genannte Gehäuse eine Videokamera (508d) aufweist, wobei die genannte Videokamera so ausgerichtet ist, dass das Sichtfeld der Kamera eine Ansicht des Kopfes des Fahrers des Fahrzeugs einschließt, wobei die genannte Spiegeleinfassung ferner ein Schaltungselement (510) einschließt, das ein elektrisches Schaltsystem zum Verarbeiten eines durch die genannte Videokamera eingefangenen Bilds aufweist, wobei das genannte Schaltungselement innerhalb der genannten Spiegeleinfassung angeordnet ist.

2. Rückspiegelbaugruppe nach Anspruch 1, bei der die genannte Videokamera eine Kamera einer ladungsgekoppelten Schaltung oder eine CMOS-gestützte Videomikrochipkamera aufweist.

3. Rückspiegelbaugruppe nach Anspruch 1 oder 2, bei der das genannte Gehäuse (506) sich von dem genannten Halter (526) zu einer Position angrenzend an die genannte Spiegeleinfassung (502) erstreckt.

4. Rückspiegelbaugruppe nach Anspruch 1, 2 oder 3, bei der die genannte Videokamera (508d) zum Gebrauch mit einem Zellulartelefon ausgelegt ist.

Revendications

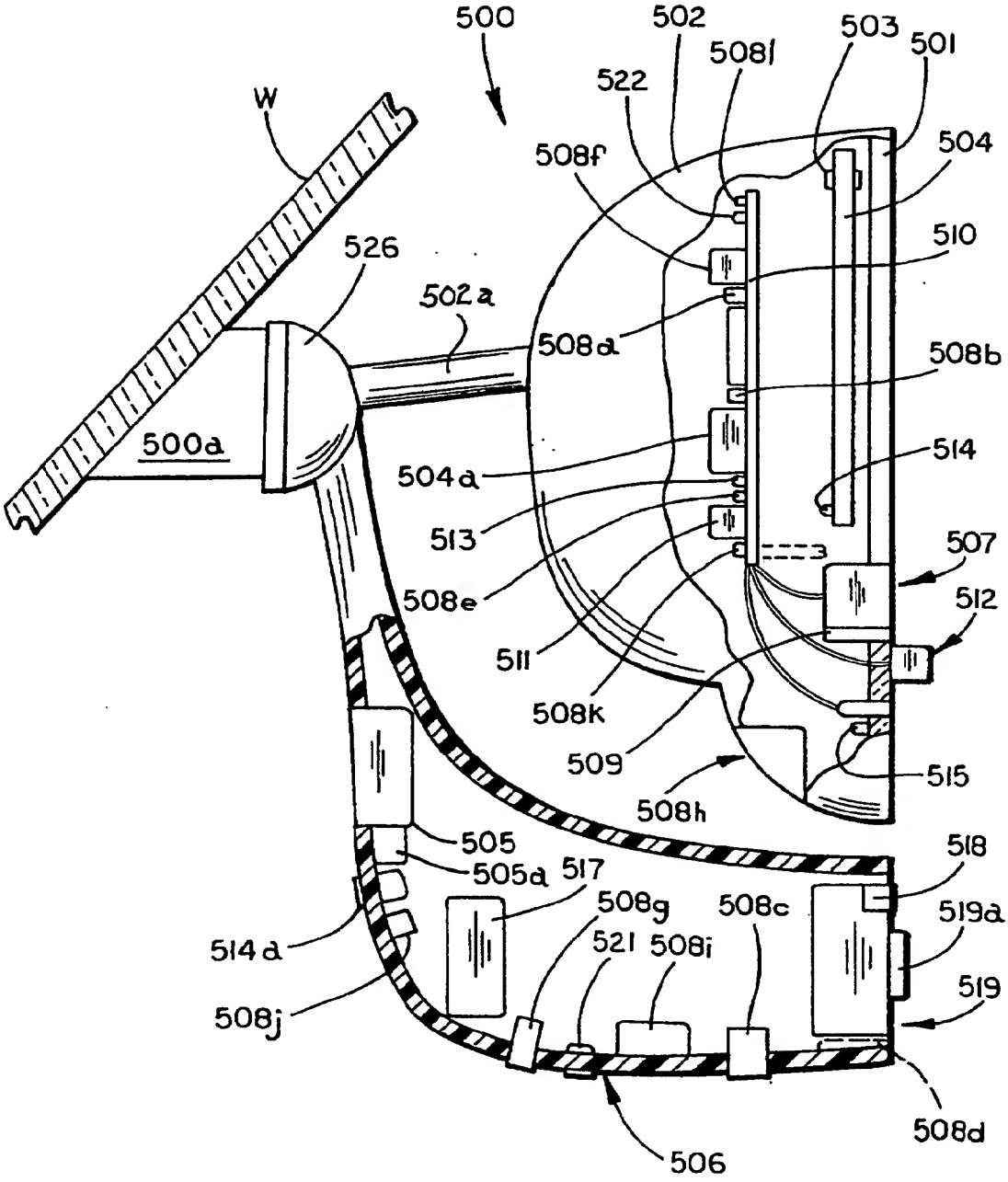
1. Un ensemble rétroviseur intérieur pour un véhicule comprenant :

un boîtier de rétroviseur (502) ayant un élément de miroir réflecteur (504) fournissant un champ de vision de l'arrière à voir par le conducteur du véhicule ; et
un support (526) pour monter ledit ensemble sur le véhicule ; **caractérisé en ce que** ;
un fuseau (506) est monté sur ledit support ; et ledit fuseau comprend une caméra vidéo (508d), ladite caméra vidéo étant orientée de sorte que le champ de vision de la caméra inclut une vue de la tête du conducteur du véhicule, ledit boîtier de rétroviseur incluant en plus un élément de circuit (510) comprenant un circuit électrique pour traiter une image capturée par ladite caméra vidéo, ledit élément de circuit situé dans ledit boîtier de rétroviseur.

2. Un ensemble rétroviseur selon la revendication 1, où ladite caméra vidéo comprend une caméra à dispositif à transfert de charge ou une caméra vidéo à circuit intégré basée sur CMOS.

3. Un ensemble rétroviseur selon la revendication 1 ou 2, où ledit fuseau (506) s'étend dudit support (526) à une position adjacente audit boîtier de rétroviseur (502).

4. Un ensemble rétroviseur selon la revendication 1, 2 ou 3 où ladite caméra vidéo (508d) est adaptée pour être utilisée avec un téléphone cellulaire.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